

REMARKS

The Official Communication dated June 8, 2007, from the United States Patent and Trademark Office (“USPTO”) withdrew the Official Action dated December 14, 2006 and suspended prosecution in the above-identified application for three (3) months to permit applicants an opportunity to submit additional evidence in support of the patentability of the present application.

Claims 89-93 and 95-121 are pending in the above-identified application. The prior Official Action dated December 14, 2006, *inter alia*, rejected Claims 89, 93, 95, 96 and 107 under 35 U.S.C. §112, first paragraph, as allegedly lacking descriptive support for the term “macroscopic”.¹

Applicants respectfully disagree. Contrary to the allegations of the USPTO, the present application describes “macroscopic amounts” as that term relates to fullerenes, including C₆₀ and C₇₀, and synonyms thereto connoting fullerenes recited in the claims (hereinafter “fullerenes”), in accordance with the provisions of 35 U.S.C. §112, first paragraph. In support, applicants are submitting, as further evidence, the executed Declarations of Drs. Terrones (“Terrones Declaration”), Darwish (“Darwish Declarations”) and Kroto (“Kroto Declaration”).

These Remarks and the attached Declarations are intended to supplement earlier filed Remarks and Declarations and other evidence previously submitted during the prosecution of the above-identified application, and are not intended to replace any of these.

The Three Declarations submitted provide additional evidence that the above-identified application complies with the requirements of 35 U.S.C. §112, first paragraph. These Declarations were based upon the disclosure in USSN 08/236,933. The above-identified

¹ The last Official Action has raised other issues, the issues raised therein have been rendered moot by the withdrawal thereof by the USPTO.

application has the same disclosure as USSN 08/236,933, and thus the testimony in these Declarations is also applicable to the above-identified application.

Dr. Terrones testified in the Terrones Declaration that the experiments were conducted exactly as described in Examples 1 and 2 of the '933 application. As testified by Dr. Terrones, he built a bell jar apparatus which was identical to the one described in the '933 application. (Paragraphs 6 and 8 of the Terrones Declaration). However, the bell jar apparatus built by Dr. Terrones had one constraint; the vaporization could only be conducted for about 2 minutes. (Paragraph 8 of Terrones Declaration). Nevertheless, Dr. Terrones has testified that the vaporization of graphite was conducted in accordance with the procedure described in the '933 application. Id. More specifically, as testified by Dr. Terrones in Paragraph 10 of the Terrones Declaration, a bell jar apparatus was evacuated to 10^{-4} torr, and filled with high purity helium. Pure graphite rods of $\frac{1}{4}$ " in diameter were utilized in the experiments conducted, wherein a one-centimeter length of the tip of each rod was reduced in diameter to about 5 millimeters, in accordance with the procedure described in the '933 application. Id. The graphite rods were evaporated by resistive heating at 100 torr helium using a current of 100 amps for about 2 minutes. Id. The vaporization of the graphite rods was collected on a substrate, an aluminum sheet (used as a collector), having a semicircular configuration, placed about 4.7 cm from the bottom of, 7.57 cm to the right of, and 11 cm from the top of, the evaporating carbon rods. Id. The bell jar apparatus was opened after a cooling down period of 20 minutes, and the black soot that was formed was removed by scraping the soot from the substrate surfaces and internal surfaces of the bell jar apparatus. Id.

On average, about 100 mg. of soot was collected from each run (Terrones Declaration, Paragraph 10). Dr. Terrones testified that the procedure was repeated until 1 gram of soot was collected. Id.

Dr. Terrones conducted another experiment in which he vaporized the graphite rods at two atmospheres, using a current of 100 amps (Paragraphs 8 and 13 of Terrones Declaration). However, he had to make a modification of the bell jar apparatus to conduct the experiment at the higher pressure. As testified in Paragraph 8 of Dr. Terrones Declaration, Dr. Terrones modified the bell jar apparatus described hereinabove by replacing the glass cover of the bell jar apparatus with an aluminum cover, which was adapted with stoppers and bolts/nuts to keep the aluminum cover in place for high-pressure operation. Further, as indicated in Paragraph 8 of his Declaration, this “aluminum reactor” was equivalent to the bell jar apparatus in the ‘933 application.

Dr. Terrones testified that the vaporization of graphite rods at 2 atm pressure and 100 amps was identical to the procedure described hereinabove, except that the aluminum reactor was used instead of the bell jar apparatus and the vaporization was conducted for about 1 minute, divided into three time periods of 25 seconds, 13 seconds and 22 seconds (Paragraph 13 of Terrones Declaration). In addition, there was no attempt to amass the soot at the higher pressure to obtain a large amount of soot, as performed for the lower pressure experiments. Paragraph 14 of Terrones Declaration. About 100 mg of soot was collected (Paragraph 13 of Terrones Declaration). Both the 1-gram sample of soot and 100 mg sample of soot were forwarded to Dr. Darwish for separation of the fullerenes therefrom (Paragraphs 10 and 14 of Terrones Declaration).

Dr. Darwish testified that he separated various fullerenes from the two samples, including C₆₀, C₇₀, C₇₆, C₇₈, C₈₄, C₈₆ and C₉₀ using techniques that were either known to one of ordinary skill in the art on August 30, 1990 (the filing date of USSN 07/575,254, the first application in the family) or described in the '933 application. (Darwish Declaration, Paragraph 9). More specifically, he utilized a soxhlet extractor using toluene as the solvent. (Paragraph 7 of Darwish Declaration). Dr. Darwish collected about 10% soot extract. Id. Various fullerenes were obtained from the soot extract, as described in Paragraph 7 of the Darwish Declaration, by utilizing preparative HPLC under the following conditions: Cosmosil 5µm PYE column (250mm x 10mm), HPLC-grade toluene as the solvent, eluted from the column at a rate of 4 ml/min. Id. The fractions eluting from the column exhibiting an absorbance at 285 nm were collected. Id. From the 1-gram sample of soot prepared from the vaporization of graphite rods at 100 torr, about 65 mg of C₆₀ crystals, 15 mg of C₇₀ crystals, and 7 milligrams of higher fullerenes comprised of C₇₆(1.2 mg), C₇₈ (1.8 mg, two isomers) C₈₄ (2.5 mg), C₈₆ (0.5 mg), and C₉₀ (1.0 mg, two isomers) were collected. Paragraph 9 of Darwish Declaration. As testified in Paragraphs 12 and 13 of the Darwish Declaration, the C₆₀ and C₇₀ that were isolated from the soot, were seen with the naked eye. (See also Exhibits 3 and 4, respectively). Moreover, as further testified by Dr. Darwish, the C₇₆, C₇₈, C₈₄, C₈₆ and C₉₀ produced from this soot were isolated in amounts that could be seen with the naked eye (See Paragraphs 14 and 22 and Exhibit 12 of Darwish Declaration).

Dr. Darwish also separated, inter alia, various fullerenes, including C₆₀ and C₇₀, from the 100 mg sample of soot that was produced from the vaporization of graphite at 2 atmosphere utilizing the same procedure as outlined above. See Paragraph 23 of Darwish Declaration. Dr. Darwish obtained 9% yield from the soot. Id. He obtained 5.0 mg of C₆₀, 1.5

mg of C₇₀ and 1 mg. of higher fullerenes from the 100-mg sample of soot produced at 2 atm (Paragraphs 24-26 of Darwish Declaration).

Further, the C₆₀, C₇₀, and higher fullerenes collected from the vaporization of graphite at 2 atm were also present in amounts that could be seen with the naked eye. (Paragraphs 24-26 of Darwish Declaration and Exhibits 13-16 attached thereto).

The testimony of Dr. Kroto is an overall summary of the experimental work of Drs. Terrones and Darwish. Dr. Kroto testified that since C₆₀, C₇₀, and higher fullerenes isolated by Dr. Darwish from various soots, which were produced from the vaporization of graphite at 2 atm and 100 torr, respectively, via resistive heating conducted by Dr. Terrones, were seen with the naked eye, the C₆₀, C₇₀, and higher fullerenes were produced in both instances in macroscopic amounts (Paragraphs 20-30 of Kroto Declaration). Moreover, as testified by Dr. Kroto, the fullerenes were prepared merely by following the procedure provided in the '933 application without undue experimentation. (Paragraph 35 of Kroto Declaration). Furthermore, as Dr. Kroto testified, the amount of fullerenes recovered from the soot prepared in accordance with the procedure described in the '933 application is about 10%, which is among the highest yield of fullerenes obtained from soot to date. (Paragraph 34 of Kroto Declaration). Moreover, as testified by Dr. Kroto, the various soots were prepared by following the procedure described in the '933 application without an undue amount of experimentation. Id. Further, as testified by Dr. Kroto, the methodology of separating the fullerenes, including C₆₀ and C₇₀, from the soot was routine to the skilled artisan on August 30, 1990. Id. Thus, the process described in the '933 application was enabling for one of ordinary skill in the art on August 30, 1990 (the effective filing date of the present application) to make macroscopic amounts of C₆₀ and C₇₀ without undue amount of experimentation. Id.

Moreover, the instant specification provides descriptive support for producing macroscopic amounts of fullerenes, including C₆₀ and C₇₀. Case law has held that to comply with the written description requirements under 35 U.S.C. §112, first paragraph, the application must convey with reasonable clarity to the skilled artisan that as of the filing date the applicant was in possession of the invention. Vas-Cath Inc. v. Mahurkar, 935 F.2d 1555, 1563-64, 19 USPQ 2d 1111, 1117 (Fed. Cir. 1991). The testimony of Drs. Terrones and Darwish and Dr. Kroto evidences that a person of ordinary skill in the art obtains macroscopic amounts of fullerenes, including C₆₀ and C₇₀, following the procedure described in the above-identified application. The procurement of macroscopic amounts of fullerenes, including C₆₀ and C₇₀, by the skilled artisan following the procedure described in the '933 application evidences that the applicants had possession at the time of filing the instant application of a process for preparing macroscopic amounts of C₆₀ and C₇₀, as claimed.

These results reinforce the statements made by Dr. Kroto in his previous Declarations in which he testified that by following the procedure described in the '933 application, he was able to prepare fullerenes, including C₆₀ and C₇₀, in macroscopic amounts. (Paragraph 9 of Kroto Declaration).

Consequently, in view of the comments herein and the Declarations of Drs. Kroto, Terrones and Darwish, it is respectfully submitted that the present case is in condition for allowance, which action is earnestly solicited.

Respectfully submitted,



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